Comments of the Electric Drive Transportation Association
to the Department of Energy
Regarding
the Quadrennial Energy Review of Transmission, Storage and Distribution Infrastructure
October, 2014

The Electric Drive Transportation Association (EDTA) is the cross-industry trade association promoting the advancement of electric drive technology and electrified transportation. Our members represent the entire value chain of electric drive, including vehicle manufacturers, battery and component manufacturers, utilities and energy companies and smart grid and charging infrastructure developers. Collectively, we are committed to realizing the economic, national security, and environmental benefits of displacing oil with hybrid, plug-in hybrid, battery, and fuel cell electric vehicles.

We strongly support the Department of Energy's Quadrennial Energy Review (QER), which will map our national energy needs and provide a "multiyear roadmap that outlines Federal energy policy objectives, legislative proposals to Congress, Executive actions, an agenda for RD&D programs and funding, and financing and incentive programs." As noted in the Department's summary of the first installment, dedicated to transmission, storage and distribution (TS&D) infrastructure: "The enormous investments in TS&D infrastructure influence supply and end use patterns, policies, investments and practices over the course of decades. Once built, the TS&D infrastructure is relatively inflexible and therefore becomes to some extent deterministic of supply and end uses."

In forecasting the future of electricity transmission and energy infrastructure, it is essential to recognize that the power sector is on the cusp of transformational change, driven in part by the emergence of new transportation technologies that will alter stationary and mobile power paradigms. Electric drive transportation technologies will enable the proliferation of energy storage; increase the reliability of central station power and expand distributed and renewable alternatives to it. Hydrogen refueling infrastructure serving fuel cell vehicles will have implications for natural gas and electricity transmission, storage and distribution infrastructures. Electric drive transportation technologies will also speed the integration of next generation supply and demand management technologies that are changing how we meet existing electricity needs and plan for future ones. For instance, utilities are already increasing the flexibility of the grid to accommodate customers' solar installations, as well as commercial and residential charging facilities for plug-in vehicles.

Electric drive is a suite of technologies used in light, medium and heavy duty vehicles that reduces our dependence on oil, which is essential to our energy, economic and environmental security objectives. By displacing oil with electricity, electric drive vehicles diversify our fuel portfolio and increase our competitiveness in global clean technology markets while reducing emissions of greenhouse gases and other pollutants.

Although new to the commercial market, electric drive vehicles sales are growing and model offerings are expanding. After less than four full years in the market, plug-in electric vehicles sales have surpassed 250,000 (as of September 2014), which is more than an 89% increase over 2013. The 20 different plug-in models (battery electric, extended range battery electric and plug-in hybrid) for sale today will be joined by an additional 20 models by the end of 2015. Public charging facilities have expanded to approximately 8,500, according to the U.S. Department of Energy (DOE), with private and workplace charging also growing rapidly. 2014 also saw the commercial debut of fuel cell passenger vehicles in the United States. The initial offering from Hyundai will be shortly joined by offerings from manufacturers including Toyota, Honda, GM and Daimler who have aggressive goals for market growth. Public and private hydrogen infrastructure efforts are being rolled out to enable widespread adoption of these zero emission vehicles, including

H_2USA, a public private partnership focused on the widespread commercial adoption of fuel cell electric vehicles, in which both DOE and EDTA participate.

Federal and state policies are reinforcing the market movement toward electric drive with efficiency and emissions regulations and incentives, including federal fuel efficiency standards and greenhouse gas emissions reductions requirements through 2025. Several states have aggressive policies to advancing electric drive transportation, including the California Zero Emission Vehicle (ZEV) mandate which requires deployment of 1.5 million ZEVs in California by 2025 and an 80% reduction in greenhouse gas emissions by 2050. This mandate has been adopted by nine other states, with a collective commitment to put a minimum of 3.3 million plug-in electric and fuel cell electric vehicles on the road in that time frame.

These changes in the transportation sector also have substantial implications for a modernized power sector and the rapidly changing natural gas sector. Batteries and hydrogen fuel cells, developing across stationary and mobile platforms, are facilitating the integration of renewable assets and are providing new options for small and utility scale energy storage and distributed generation. Electric drive vehicles will also help to accelerate the development of the smart grid, which will maximize the efficiency of use of existing grid assets.

Energy Storage

Electric drive transportation will spur the greening of the grid through energy storage. Advanced batteries have primary and secondary use applications in energy storage that would enable the greater use of intermittent renewable resources in the grid. A recent study by the University of California, Los Angeles, and UC Berkeley law schools detailed the opportunity for California to employ electric vehicle batteries for home and utility-scale energy storage to help the state achieve mandated levels of renewable energy resources into the grid.[1] Funded by Southern California Edison and DOE as part of the American Recovery and Reinvestment Act, the utility is demonstrating the nation's largest battery energy storage system, 32 MWh and its value to the grid in the Tehachapi Wind Energy Storage Project. The Project, which is expected to generate up to 4,500 MW of wind energy by 2016, will demonstrate the effectiveness of lithium-ion battery and smart inverter technologies in aiding the integration of variable energy resources and improving grid performance.

In the near term, natural gas will be a primary source of hydrogen. Hydrogen infrastructure and infrastructure associated with expanded use of natural gas should be developed as complementary systems. Hydrogen, produced through electric processes, will also help integrate renewables into the power system and meet the growing need for energy storage. Renewable energy can be stored, through electrolysis, in compressed or liquid hydrogen or chemically bonded to hydride complexes.

Hydrogen can be used in large-scale fuel cells to produce electricity on-site or in fuel cell electric vehicles. It can also utilize existing infrastructure, such as natural gas pipelines or other pipelines to serve central power planning needs. The growth of fuel cell electric vehicles and the associated hydrogen infrastructure in the transportation sector will expand pathways for using hydrogen for storage in the power sector - while driving technology and market development in both sectors.

[1] REUSE AND REPOWER, How to Save Money and Clean the Grid with Second-Life Electric Vehicle Batteries, Ethan N. Elkind, Associate Director of the Climate Change and Business Research Initiative at the UCLA School of Law's Emmett Institute on Climate Change and the Environment and UC Berkeley School of Law's Center for Law, Energy & the Environment (CLEE), September 2014

Distributed Energy and Smart Grid Integration

Utilities, data companies and vehicle manufacturers are working to integrate battery electric vehicles into the grid, maximizing efficient use and establishing vehicles' value as grid assets. For instance, eight automakers, 15 utilities and the Electric Power Research Institute recently announced a collaboration to develop and demonstrate an open platform that will allow manufacturers to offer a customer-friendly interface through which plug-in electric vehicles drivers can more easily participate in utility programs, such as rates for off-peak or nighttime charging.

According to the Institute for Energy Innovation[2], there are an estimated 50 million smart meters deployed today. The proliferation of smart meters and vehicle telematics will enable new functionality for the grid and for grid-connected vehicles. As the electric grid gets "smarter," providing real time 2-way information to consumers and power providers, electric vehicles can serve as a distributed energy resource. The vehicles can contribute to grid reliability by balancing renewable generation and providing ancillary services, including frequency regulation and voltage support.

Stationary hydrogen fuel cell systems available today can generate clean electricity at the point of demand and can be used to meet baseload power needs or to provide peaking power. For instance, 25% of the electricity needs of Honda's facility in Torrance, California are met with a stationary fuel cell system. Stationary and transportation energy infrastructure can provide mutual benefits of reduced energy costs and increased overall operational efficiency in systems where hydrogen fueling is part of a distributed cogeneration system that also produces a building's heat and electricity.

The historical distance between the stationary power and transportation sectors is narrowing and the foregoing are just a sampling of the ways in which power and transportation technologies and infrastructure can provide enhanced value across sectors. Batteries and fuel cells developed for automobiles and their supporting infrastructures provide unprecedented opportunities to make the transportation sector cleaner, more diverse and more secure. They also can provide these benefits to the power sector: enabling renewables, serving as grid and distributed power assets and speeding the integration of smart grid technologies to maximize the use of all power assets.

Conversely, the benefits of electric drive to the transportation and power sectors can be inhibited by energy policies and plans that do not anticipate or encourage the integration of electric and hydrogen infrastructure. Policies need to recognize developing technologies that integrate vehicles into the grid and consider how best to promote that evolution. DOE is already working with the private sector to speed the adoption of electric drive through the EV Everywhere Initiative and H_2USA; this work can usefully inform the QER of the opportunities and challenges to be addressed.

As DOE explained regarding the subject of this first QER installment, investments in energy infrastructure are both capital intensive and long-lived. Inadequate vision and planning for the future can strand us in the systems of the past. We hope that this QER acknowledges and embraces the opportunities that electric drive technologies and infrastructure provide for transforming the power sector, as well as the transportation sector and look forward to working with you to identify the most effective pathways to do that.

Thank you for the opportunity to comment.

[2] Utility-Scale Smart Meter Deployments: Building Block of the Evolving Power Grid, Institute for Electric Innovation, September 2014.